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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/587,427

07/26/2006

Eri Tsukada

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AIR LIQUIDE

Intellectual Property

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HOUSTON, TX 77056

EXAMINER

CHEN, BRET P

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/587,427	Applicant(s) TSUKADA ET AL.	
	Examiner Bret Chen	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 11-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/26/06</u> . | 6) <input type="checkbox"/> Other: ____. |

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DETAILED ACTION

Claims 11-20 are pending in this application. The preliminary amendment dated 7/26/06 adding new claims 11-20 and canceling claims 1-10 has been entered.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/046254 A1. WO'254 discloses a method for fabricating silicon nitride, silicon oxynitride and silicon oxide films by chemical vapor deposition (p.1 lines 4-5) such as low-pressure CVD (line 10) by reacting precursors including aminosilane (p.8 line 4 - p.9 line 7) with a second reaction gas such as hydrazine (col.9 lines 11-13). The substrate temperature can be 300-900°C and the

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pressure can be 0.05 Torr – atmospheric pressure (p.9 lines 14-16). The molar ratio between the silicon nitride precursor and the second reaction gas is from 1:1 to 1:20 (p.9 lines 17-19).

However, the reference fails to teach the specific formulas.

It is noted that the reference clearly teach the use of an aminosilane and hydrazine as noted above. One skilled in the art would reasonably expect that different aminosilanes and hydrazines can be utilized with similar predictabilities and hence, would have been obvious to utilize different formulas with the expectation of obtaining similar results.

In dependent claims 12-14, the applicant requires a specific temperature, pressure, and molar ratios. This issue has been addressed above.

In independent claim 15, the applicant requires forming a silicon oxynitride film. WO '254 teaches same by incorporating an oxygen-containing gas such as oxygen, ozone, hydrogen peroxide and water, to the precursor mixture (p.11 lines 8-14). The precursor to oxygen ratio can be varied (lines 16-17).

The limitations of claims 16-20 have been addressed above.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

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A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 11-20 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. 7,192,626 in view of WO 03/046254. Dussarrat discloses a method for producing silicon nitride films by thermal chemical vapor deposition comprising: i) feeding a trisilylamine gas and an ammonia gas into a chemical vapor deposition reaction chamber that contains at least one substrate; ii) forming a silicon nitride films on said at least one substrate by reacting said gases under predetermined temperature and pressure conditions; and iii) providing a flow rate ratio between said ammonia gas to said trisilylamine gas fed in said reaction chamber equal to or greater than about 10. However, the reference fails to teach aminosilane.

WO'254 discloses a method for fabricating silicon nitride, silicon oxynitride and silicon oxide films by chemical vapor deposition (p.1 lines 4-5) such as low-pressure CVD (line 10) by reacting precursors including aminosilane (p.8 line 4 - p.9 line 7) with a second reaction gas such as hydrazine (col.9 lines 11-13). It would have been obvious to substitute the aminosilane of WO'254 for the trisilylamine of Dussarrat with the expectation of obtaining similar results.

Claims 11-20 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 of U.S. Patent No. 7,064,083 in view of WO 03/046254. Dussarrat discloses a method of forming a silicon nitride film on a semiconductor

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substrate comprising: (a) introducing into a reaction chamber: 1) at least one said substrate; 2) a hexakis(monohydrocarbylamino)disilane with general formula (I) $((R)HN)_3-Si-Si-(NH(R))_3$ (I) wherein each R independently represents a C₁ to C₄ hydrocarbyl group; and 3) a nitrogen containing gas; and (b) inducing a reaction between said hexakis(monohydrocarbylamino)disilane and said gas. However, the reference fails to teach aminosilane.

WO'254 discloses a method for fabricating silicon nitride, silicon oxynitride and silicon oxide films by chemical vapor deposition (p.1 lines 4-5) such as low-pressure CVD (line 10) by reacting precursors including aminosilane (p.8 line 4 - p.9 line 7) with a second reaction gas such as hydrazine (col.9 lines 11-13). It would have been obvious to substitute the aminosilane of WO'254 for the hexakis(monohydrocarbylamino)disilane of Dussarrat with the expectation of obtaining similar results.

Claims 11-20 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 3-13 of U.S. Patent No. 7,019,159 in view of WO 03/046254. Dussarrat discloses a method of preparing hexakis (monohydrocarbylamino)disilanes with said formula (I) $((R)HN)_3-Si-Si-(NH(R))_3$ (I) wherein each R independently represents said C₁ to C₄ hydrocarbyl, comprising reacting hexachlorodisilane in an organic solvent with at least 6-fold moles of the corresponding monohydrocarbylamine RNH_2 (wherein R is a C₁ to C₄ hydrocarbyl group). However, the reference fails to teach aminosilane.

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WO'254 discloses a method for fabricating silicon nitride, silicon oxynitride and silicon oxide films by chemical vapor deposition (p.1 lines 4-5) such as low-pressure CVD (line 10) by reacting precursors including aminosilane (p.8 line 4 - p.9 line 7) with a second reaction gas such as hydrazine (col.9 lines 11-13). It would have been obvious to substitute the aminosilane of WO'254 for the hexakis (monohydro-carbylamino)disilanes of Dussarrat with the expectation of obtaining similar results.

Claims 11-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-16 of copending Application No. 11/674895 in view of WO 03/046254. Dussarrat discloses a method for producing silicon oxynitride films by thermal chemical vapor deposition comprising: a) feeding a trisilylamine gas, an ammonia gas, and an oxygen-containing gas into a chemical vapor deposition reaction chamber that contains at least one substrate; and b) forming a silicon oxynitride film on said at least one substrate by reacting said gases under predetermined temperature and pressure conditions, wherein the predetermined temperature is equal to or lower than 600°C. However, the reference fails to teach aminosilane.

WO'254 discloses a method for fabricating silicon nitride, silicon oxynitride and silicon oxide films by chemical vapor deposition (p.1 lines 4-5) such as low-pressure CVD (line 10) by reacting precursors including aminosilane (p.8 line 4 - p.9 line 7) with a second reaction gas such as hydrazine (col.9 lines 11-13). It would have been obvious to substitute the aminosilane of WO'254 for the trisilylamine of Dussarrat with the expectation of obtaining similar results.

This is a provisional obviousness-type double patenting rejection.

Claims 11-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 18-35 of copending Application No. 10/553573 in view of WO 03/046254. Dussarrat discloses a method which may be used for producing a silicon nitride film by vapor-phase growth, wherein said method comprises: a) feeding a first hydrazine gas and at least one precursor gas into a reaction chamber, wherein: 1) said precursor gas comprises at least one member selected from the group consisting of: i) trisilylamine gas; and ii) silylhydrazine gas; and 2) at least one substrate is located in said reaction chamber; and b) forming a silicon nitride film on said substrate by reacting said first hydrazine gas and said precursor gas. However, the reference fails to teach aminosilane.

WO'254 discloses a method for fabricating silicon nitride, silicon oxynitride and silicon oxide films by chemical vapor deposition (p.1 lines 4-5) such as low-pressure CVD (line 10) by reacting precursors including aminosilane (p.8 line 4 - p.9 line 7) with a second reaction gas such as hydrazine (col.9 lines 11-13). It would have been obvious to substitute the aminosilane of WO'254 for the trisilylamine of Dussarrat with the expectation of obtaining similar results.

This is a provisional obviousness-type double patenting rejection.

Claims 11-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 19-50 of copending Application No. 11/020712 in view of WO 03/046254. Hoshi discloses a method which may be used for forming a silicon nitride film said method comprising forming a silicon nitride film with a gaseous silicon source, a gaseous nitrogen source, and a gaseous carbon-hydrogen source, wherein: a) said silicon source comprises at least silicon; b) said nitrogen source comprises at

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least nitrogen; and c) said carbon-hydrogen source comprises at least one compound comprising a carbon-hydrogen bond. However, the reference fails to teach aminosilane.

WO'254 discloses a method for fabricating silicon nitride, silicon oxynitride and silicon oxide films by chemical vapor deposition (p.1 lines 4-5) such as low-pressure CVD (line 10) by reacting precursors including aminosilane (p.8 line 4 - p.9 line 7) with a second reaction gas such as hydrazine (col.9 lines 11-13). It would have been obvious to utilize the aminosilane of WO'254 in Hoshi's process with the expectation of obtaining similar results.

This is a provisional obviousness-type double patenting rejection.

Claims 11-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 14-27 of copending Application No. 10/497191 in view of WO 03/046254. Dussarrat discloses a method which may be used for fabricating a silicon nitride film by chemical vapor deposition, said method comprising: a) introducing at least one first reaction gas comprising a silicon nitride precursor into a reaction chamber containing at least one substrate, wherein said precursor comprises at least one member selected from the group consisting of: 1) $\text{Si}(\text{NHR}_{\text{sub.i}})_{\text{sub.4}}$, and 2) $\text{SiH}(\text{NHR}_{\text{sub.i}})_{\text{sub.3}}$, wherein each R_1 represents a $\text{C}_{\text{sub.1}}$ to $\text{C}_{\text{sub.4}}$ hydrocarbyl; b) introducing a second reaction gas into said chamber, wherein said second gas comprises at least one member selected from the group consisting of: 1) ammonia; 2) hydrazine; 3) alkylhydrazine compounds; and 4) hydrogen azide; and c) heating said chamber to a temperature between about 300.degree. C. to about 900.degree. C., while maintaining a pressure in said chamber of about 0.05 Torr to about atmospheric pressure. However, the reference fails to teach aminosilane.

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WO'254 discloses a method for fabricating silicon nitride, silicon oxynitride and silicon oxide films by chemical vapor deposition (p.1 lines 4-5) such as low-pressure CVD (line 10) by reacting precursors including aminosilane (p.8 line 4 - p.9 line 7) with a second reaction gas such as hydrazine (col.9 lines 11-13). It would have been obvious to substitute the aminosilane of WO'254 for the Si(NHR.sub.i).sub.4 in Dussarrat's process with the expectation of obtaining similar results.

This is a provisional obviousness-type double patenting rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bret Chen whose telephone number is (571)272-1417. The examiner can normally be reached on 7:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bret Chen/

Primary Examiner, Art Unit 1792

8/10/08